REMARKS

Applicants hereby petition for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-0733.

Applicants have amended the claims to correct grammatical errors and to remove redundant wording within the claims.

Applicants have amended the specification to correct typographical errors.

If for any reason the Examiner believes the amendment should not be entered or there are any questions, the examiner is requested to contact the undersigned at (202) 508-9119.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the specification:

The paragraph beginning at line 7 of page 4 has been amended as follows:

In conventional frame relay, a layer 2 Q.922 frame carries the layer 3 customer data packet across the network in a permanent virtual circuit (PVC) which is identified by a data link connection identifier (DLCI). Thus, the DLCIs are used by the customer as addresses that select the proper PVC to carry the data to the desired destination. The customer data packet is carried across the network transparently and its contents ~~is~~ are never examined by the network.

The paragraph beginning after line 17 of page 10 has been amended as follows:

Fig. 16 shows a partitioned routing table for the same two customers as in Fig. ~~16~~ 15;

The paragraph beginning at line 5 of page 11 has been amended as follows:

Referring to Fig. 7, a block diagram of a wide area network (WAN) 1 incorporating aspects of the present invention is shown. The WAN 1 includes a plurality of customer ~~premise~~ premises equipment (CPE) ~~system~~, for example routers located at each of the end user locations and interconnected via one or more service provider's networks (SPNs) 500. The SPN 500 is typically connected to a plurality of endpoint routers 919 via a plurality of corresponding user network interfaces (UNIs) 402 and/or one or more internet protocol (IP) switches 502. The IP switches 502, UNIs 402, and/or routers/switches 501 may be interconnected so as to form a meshed network (e.g., a partial or fully meshed network). Additionally, the wide area network

(WAN) 1 may contain any number of IP switches 502 located within the WAN 1 such that it is not connected directly to any endpoint routers 919, and/or one or more IP switches 502 may be located at an interface between the SPN 500 and an endpoint router 919. In further embodiments of the invention, there may be multiple endpoint routers 919 associated with a UNI 402/IP switch 502 and/or multiple UNIs 402/IP switches 502 associated with an endpoint router 919.

The paragraph beginning at line 9 of page 12 has been amended as follows:

In some embodiments, the WAN 1 may include a combination of conventional network switches and/or routers 501 in addition to IP switches 502. On the other hand, every switch in the SPN 500 may be an IP switch 502. Alternatively, the WAN 1 may contain only a single IP switch 502. The IP switches 502 may be variously configured to include a suitable multi-layer routing switch such as a Tag Switch from Cisco. Multi layer routing switches may also be utilized from vendors such as Ipsilon, Toshiba, IBM, and/or Telecom. IP switches are currently being developed to replace endpoint routers so that customer ~~premise~~ <u>premises</u> equipment (e.g., Ethernet local area network (LAN) equipment) can connect directly to an asynchronous transfer mode (ATM) network. Aspects of the present invention propose using IP switches in a different manner to maintain the huge installed base of customer ~~premise~~ <u>premises</u> equipment while avoiding the limitations of previous systems. Accordingly, the IP switches in accordance with embodiments of the invention are disposed within the SPN 500 and modified to provide suitable routing and interface functions.

The paragraph beginning at line 10 of page 13 has been amended as follows:

In further embodiments of the invention, an endpoint router 919 may encapsulate one or more IP packets in frame relay ~~frame~~ frames 914. In this event, the frame relay frames may be transmitted between an endpoint router 919 and a corresponding UNI 402 and/or IP switch 502. The endpoint router 919 encapsulates IP packets 950 with frame relay frames 914. Further, the endpoint router 919 may set the DLCI of each frame relay frame 914 according to a particular service category (if a service category DLCI is used) that the user has selected. For example, the various service categories may include the public internet, communication via a local intranet, communication within a closed user group (CUG), communication with an extranet (e.g., a network of trusted suppliers or corporate trading partners), live audio/video transmission, multicasting, telephony over internet protocol (IP), or any combination thereof. Thus, the concept of a frame relay PVC is significantly expanded by aspects of the present invention. For example, the location of an intended network endpoint recipient is not necessarily determined by a DLCI at the endpoint routers 919.

The paragraph beginning at line 2 of page 14 has been amended as follows:

In further embodiments of the invention, a UNI 402 may receive frame relay frames 914 from an endpoint router 919 and divides and encapsulates frame relay frames into, for example, smaller fixed-length ATM cells. The UNI 402 may further ~~translates~~ translate the frame relay DLCI into an ATM address (e.g., a virtual path identifier/virtual channel identifier (VPI/VCI)). There are

various methods which may be used to translate DLCIs to VPI/VCIs. For example, the Network Interworking Standard as defined in Implementation Agreement #5 of the Frame Relay Forum, and/or the Service Interworking Standard as defined in Implementation Agreement #8 of the Frame Relay Forum may be utilized. An ATM address associated with a service category ~~DLCIs~~ DLCI defines an ATM virtual path via network routers to an IP switch 502. Thus, ATM data associated with a service category DLCI is ultimately sent to an IP switch 502. However, ATM data associated with a conventional DLCI may or may not be sent to an IP switch 502 and may be routed through the network without passing through an IP switch 502. Thus, both translated IP data and conventional PVC data may be present in the SPN 500 and/or WAN 1.

The paragraph beginning at line 20 of page 15 has been amended as follows:

At the ~~UNI A~~ UNI 402, the switching based on the DLCI takes place. The packet may be routed to IP switch 502 in the center of the SPN 500. The first packet has its layer 2 frame stripped off as it is forwarded to VPN A. Within VPN A, the layer 3 address is now used to make routing decisions that send the packet to its destination UNI. Thus, no PVC need be established ahead of time for that path, and conventional routing methods and protocols can be used, as well as newer "short-cut" routing techniques. This permits VPN A to provide a high "mesh" of connectivity between sites without requiring the customer to configure and maintain the "mesh" as a large number of PVCs. The packet forwarded to VPN B is treated similarly except that VPN B is implemented with a lower service class (e.g. higher delay). Finally, the packet forwarded to PVC D has its layer 2 frame intact and passes through the network as a conventional frame relay frame.

This allows customers to maintain their current connectivity of PVCs for their high utilization traffic paths, but still have a high mesh of connectivity through various VPNs.

The paragraph beginning at line 13 of page 20 has been amended as follows:

As the service grows, the functionality for making the VPN routing decisions may be migrated closer to the customer and may eventually be present in every switching node, as shown in Fig. 13. This can reduce the backhaul previously needed to get to the router/switch processing nodes and allow for optimal routing using all the nodes in the WAN 1 and/or SPN 500. In the exemplary embodiment of Fig. 13, VPN #1 is connected to Customer Sites A, B, C, and D. Here, every switching node includes a switch 1501 and a routing element 1502. ~~frame~~ Frame relay frames 1500 having a DLCI directed to Customer Site B may be sent from Customer Site A. In such a case, frames 1503 would be sent through VPN #1 via switching nodes 1501, 1502, and frames 1504 would be received at Customer Site B.

In the claims

10. (Amended) The method of claim 2 wherein the user data includes an Internet protocol (IP) packet.

25. (Amended) The method of claim 24 wherein the service categories are determined using Internet protocol (IP) data within a data field of a packet passed by the asynchronous transfer mode switch.

27. (Amended) In a fast packet network, a method comprising the steps of:

receiving a fast packet;

comparing an address of the fast packet with a layer 3 Internet protocol (IP) address contained within the fast packet; and

determining whether the address is consistent with the layer 3 internet protocol address; wherein the step of determining includes~~ing~~ examination of a sending address or a destination address.

34. (Amended) The network of claim 32 wherein the translation circuitry is responsive to Internet protocol (IP) data within the frame relay data packets.

35. (Amended) The network of claim 34 wherein the translation circuitry is responsive to layer 3 Internet protocol (IP) data.

41. (Amended) The asynchronous transfer mode switch of claim 38 wherein the translation circuitry determines the different service categories using layer 3 Internet protocol (IP) data.

42. (Amended) The asynchronous transfer mode switch of claim 38 wherein the translation circuitry determines the different service categories using layer 4 Internet protocol (IP) data.

43. (Amended) An asynchronous transfer mode switch comprising translation circuitry for translating a plurality of frame relay packets into asynchronous transfer mode cells having an address responsive to layer 3 Internet protocol (IP) data contained within a user data field of the frame relay packets.

44. (Amended) An asynchronous transfer mode switch comprising translation circuitry for

translating a plurality of frame relay packets into asynchronous transfer mode cells having an address responsive to layer 4 Internet protocol (IP) data contained within a user data field of the frame relay packets.

45. (Amended) A fast packet network having a node, said node including error checking circuitry for determining routing errors by comparing an address of a fast packet with layer 3 Internet protocol (IP) data contained within the fast packet.

51. (Amended) A method comprising the steps of:

receiving a plurality of frame relay frames at an asynchronous transfer mode switch in a mesh network; and

transmitting at least a portion of the frames over one of a plurality of virtual networks responsive to Internet protocol (IP) information contained in at least one of the frame relay frames.